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OBSERVATIONS ON THE TRUE BUGS *EMESA TENERRIMA*, A POSSIBLE SPIDER MIMIC, AND *GHILIANELLA BORINCANA* (HEMIPTERA: REDUVIIDAE: EMESINAE) FROM PUERTO RICO

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Abstract.—*Emesa tenerrima* and *Ghilianella borincana* were observed in a semi-evergreen forest of northern Puerto Rico during day hours for eleven months. *Emesa tenerrima* lives on the webs of the pholcid spider *Modisimus signatus* with which it shares the elongated body form and banded coloration pattern of its legs. Mild disturbances induce mantid-like displays; stronger disturbances produce easy movement over the web or flight escape. Live pholcids were not observed coinhabiting the webs occupied by *E. tenerrima*. *Ghilianella borincana* is not a web inhabitant, shows no interest in offered pholcids but seems to eat spiders. It intermingles with dark vegetation debris and, with the aid of catalepsis, is highly cryptic. Disturbed individuals drop from the substrate.

Key Words: Emesinae, Pholcidae, spider mimicry, mimicry

Hinton (1973, 1976) noted that while numerous spiders mimic insects, no insects indisputably mimic spiders. Only recently has the occurrence of spider mimicry been confirmed (Greene et al. 1987, Mather and Roitberg 1987, Whitman et al., in press). Emesine true bugs (Hemiptera: Reduviidae: Emesinae) are frequently associated with spiders (Gagné and Howarth 1975, Hickman 1971, Wygodzinsky 1966).

One of us (JASB) noticed a "stick-like spider" inhabiting a pholcid web in the understory of a semi-evergreen forest of northern Puerto Rico. Upon manipulation with forceps, the arthropod disclosed its true identity: *Emesa tenerrima*, an emesine (Fig. 1). Several specimens, including a second emesine, *Ghilianella borincana* (Fig. 2), were observed in dark vegetation debris suspended in the forest. This paper documents some biological features of *Emesa tenerrima* and *Ghilianella borincana*, and suggests their possible biological significance.

METHODS

The study site, a semi-evergreen, subtropical moist, premontane forest (Ewel and Whitmore 1973, Holdridge 1982), is located in a limestone hill, a short walk off road 2, km. 21.4 (near junction road 165), Toa Baja. Observations were done, usually during the mornings of 12 different days, from September 1983 to August 1984. Each observation period lasted a minimum of ten minutes. Observations were made on different individuals of each species. Six observation periods were devoted to *E. tenerrima*, seven to *G. borincana*. Detection of *G. borincana* was facilitated by placing a white background behind possible residence places. Simple manipulations were performed to observe the reactions of the eme-

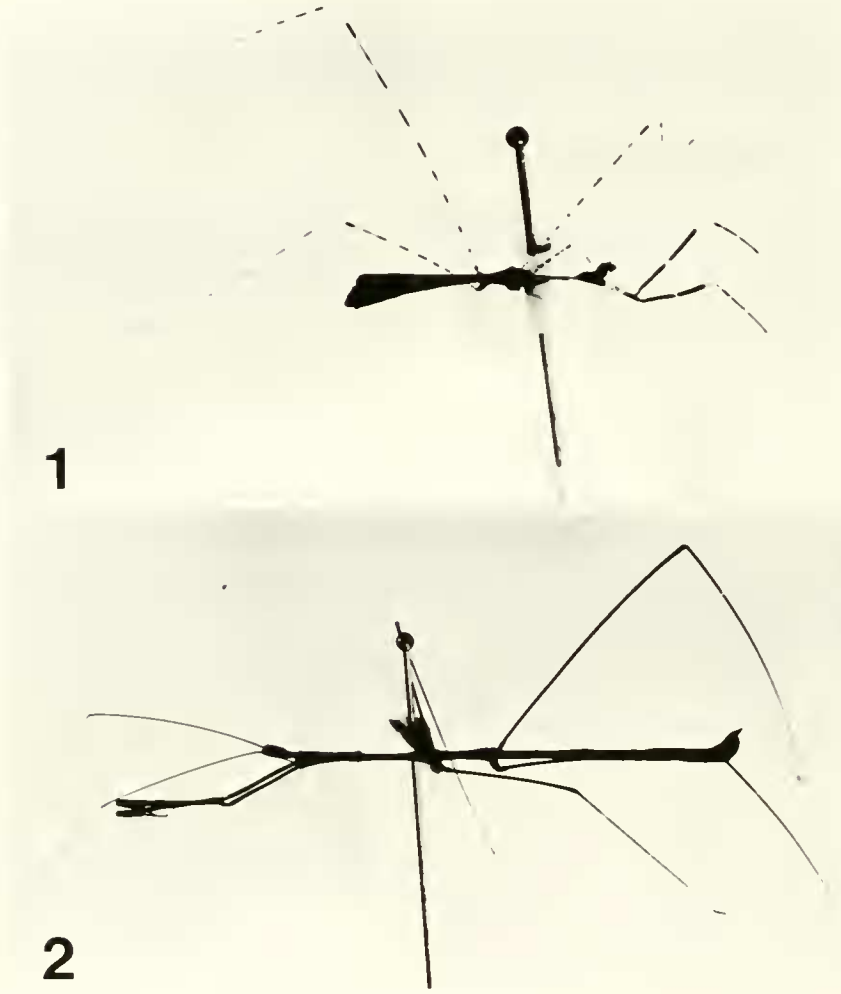

Fig. 1. *Emesa tenerrima*. Pin length about 40 mm.
Fig. 2. *Ghilianella borincana*. Pin length about 35 mm.

sines to artificial stimuli. Voucher specimens are deposited in the Entomology Museum, Agricultural Experiment Station, Univ. Puerto Rico, Mayagüez Campus (at Río Piedras), Puerto Rico.

Results

Emesa tenerrima (Dohrn, 1860)
(Fig. 1)

This winged, silvery grayish-black emesinine was always collected on webs of *Modisimus signatus* (Banks) (Pholcidae). Webs of this spider were found on the branches of *Quararibaea turbinata* (Bombacaceae), a common shrub on the study site. The webs were located 0.25–2.00 m above ground in shady areas (50–75% leaf cover). As noted for other emesines, *E. tenerrima* was usually observed on the web, hanging upside down, and did not entangle, even if suddenly forced to move. *Emesa tenerrima* resembles *M. signatus* in its overall elongate body form

and silver/black transverse banded legs. However, the body, excluding the legs, of *E. tenerrima* is much longer and more robust than that of *M. signatus*. Remnants of dead spiders, including a *Modisimus signatus*, were found twice in the emesine inhabited web, but *E. tenerrima* and *M. signatus* were not observed coinhabiting a web.

When warm air was blown directly toward *E. tenerrima*, or when the branch supporting the web was repeatedly touched, adduction of the meso- and metathoraxic legs followed. However, the forelegs adducted only when they were touched, then the femora and tibiae apposed in a mantid-like posture. Gentle touch with forceps of the antennae, the meso- and metathoraxic femora, or tibiae prompted quick walking and escape from the web to surrounding vegetation. Subsequent manipulation was followed by escape to the ground where the insect was extremely difficult to detect. Escape was also achieved by flight (speed ≅ 3 m in 10 s, n = 1).

Ghilianella borincana (Maldonado, 1960)

(Fig. 2)

This wingless, dark-brown metapterinine lives on vegetation debris in very shady areas that hangs vertically from *Coffea arabica* (Rubiaceae) or *Q. turbinata*. There it hangs by four legs, with the fore legs adducted and apposed, as in *E. tenerrima*, but with the head directed downwards. At times, remnants of other spider species were noticed on the debris. *Ghilianella borincana* was observed once on the border of a pitfall trap with a small unidentified spider held between a fore femur and tibia.

Ghilianella borincana exhibited catalepsis. When a branch with *G. borincana* was touched over 30 times, only the antennae moved, becoming perpendicular to the longitudinal axis of the body. At times specimens were left unattended for more than 10 min, either on vegetation debris or on a white piece of paper, and no change in position was noted. However, rubbing a pencil in front of an emesine placed on a piece of paper made the insect move away. Escape occurred by dropping from the substrate. When living pholcids were brought close to a *G. borincana*, no reaction was observed.

Discussion

Reports of emesine/spider associations are summarized by Wygodzinsky (1966). *Nesidiolestes ana* and *Empicoris rubromaculatus* have been observed using webs as a place to feed (Gagné and Howarth 1975, Hickman 1971), whereas *Stenolaemus edwardsii* is known to feed on its host spiderlings (Hickman 1971, Maldonado-Capriles and van Doesburg 1966).

Twelve emesines are known for Puerto Rico, but their biology is unknown (Maldonado-Capriles 1986). Our data are insufficient to indicate the nature of the biological association between *E. tenerrima* and *M. signatus*. One possibility is that the resemblance of the emesine leg pattern to that of the spider short-circuits intraspecific communication (Greene et al. 1987, Mather and Roitberg 1987, Whitman et al., in press), thus, possibly representing a case of aggressive mimicry. The fact that we did not see live pholcids coinhabiting the web with *E. tenerrima* questions this hypothesis, unless spiders actually were eaten at the time of observation. Another possibility is that *E. tenerrima* simply uses the web as a place to live, at least during the day hours.

Ghilianella borincana, in contrast, may find protection by remaining on vegetation debris, at least during the day hours. Resemblance to other objects has been reported for a predatory ant-mimic mirid (Wheeler and Henry 1980), a termite-eating (McMahan 1983) and medically important reduviids (Harwood and James 1979), and an asopine pentatomid nymph that mimics its chrysomelid prey (Bourdouxhe and Jolivet 1981). We have not found comments concerning similarity of emesines to a substrate habitat.

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